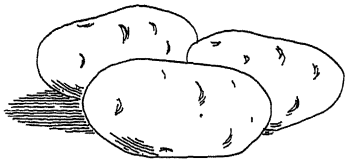
Bulletin 589

Potato Late Blight

QUESTIONS AND ANSWERS

COOPERATIVE EXTENSION SERVICE
THE OHIO STATE UNIVERSITY



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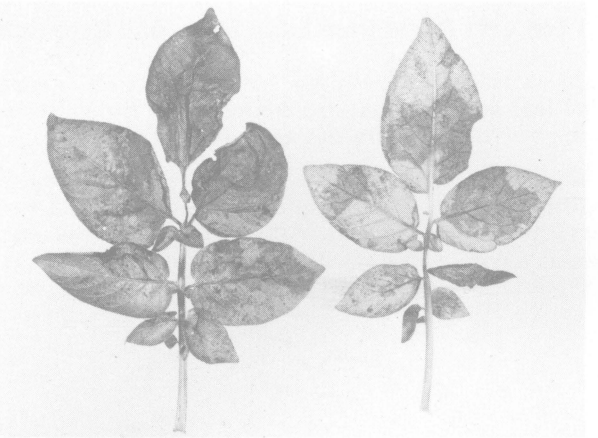
Late blight can be one of the most serious diseases facing Ohio potato growers. The problem is an old one. It first caused a major epidemic in Ireland in the summer of 1845. During the following 15 years, over a million people died and nearly one and a half million fled to North America as a direct result of the late blight epidemics Present day epidemics in Ohio are not as catastrophic, but the economic losses due to this disease can be severe. Ohio potato growers must be well informed about this pest in order to minimize losses when epidemics occur.

Following are answers to important questions often asked by growers who suspect late blight problems. Further information can be obtained by contacting the Department of Plant Pathology at the Ohio Agricultural Research and Development Center, Wooster, or at The Ohio State University, Columbus

Q What Causes Potato Late Blight?

A The disease is caused by a microscopic fungus with the scientific name *Phytophthora infestans,* meaning "plant destroyer." The fungus infects the plant through the leaves and grows throughout the tissues, killing and drawing its nutrition from them.



Potato leaves showing late blight infection symptoms

Q What Does Late Blight Look Like on Potato Leaves and Tubers?

A **Leaves:** Late blight usually develops first on the lower leaves as circular or irregular water-soaked spots, often at leaf tips or edges. During moist, cool weather, these spots enlarge rapidly to form dark-brown to purplish-black, blighted areas often surrounded by a pale, yellowish-green, water-soaked zone (Fig. 1). During damp weather or in the morning when dew is heavy, a **white,** velvety, mildew growth is visible on the infected leaves, especially on the undersides. In dry weather, the mildew disappears and the infected tissues become brown and dry. Lesions resembling blackened strips may be present on stems.

Tubers: Infected tubers have irregular, slightly-sunken, purplish-brown lesions, often concentrated on the upper surface only. When cut, a copperish-brown discoloration is visible and the infected tissue is granular in texture. This infection starts just below the skin and usually penetrates only ¼ inch to ½ inch deep (Fig. 2). When the disease develops without complications (such as mechanical damage to tubers, high temperatures or rainy weather), the tuber symptoms are quite distinctive, showing brown, dry, sunken lesions (cover photo). The slimy "wet rot" associated with late blight occurs in the field or in storage only when secondary organisms, usually bacteria, follow the late blight infection.

Q How Can I Tell Late Blight from Early Blight and Botrytis Blight?

A **Early blight,** caused by the fungus *Alternaria solani,* causes circular-type lesions on the leaf surfaces that are composed of brown to black concentric rings. Mildew growth is usually not evident.

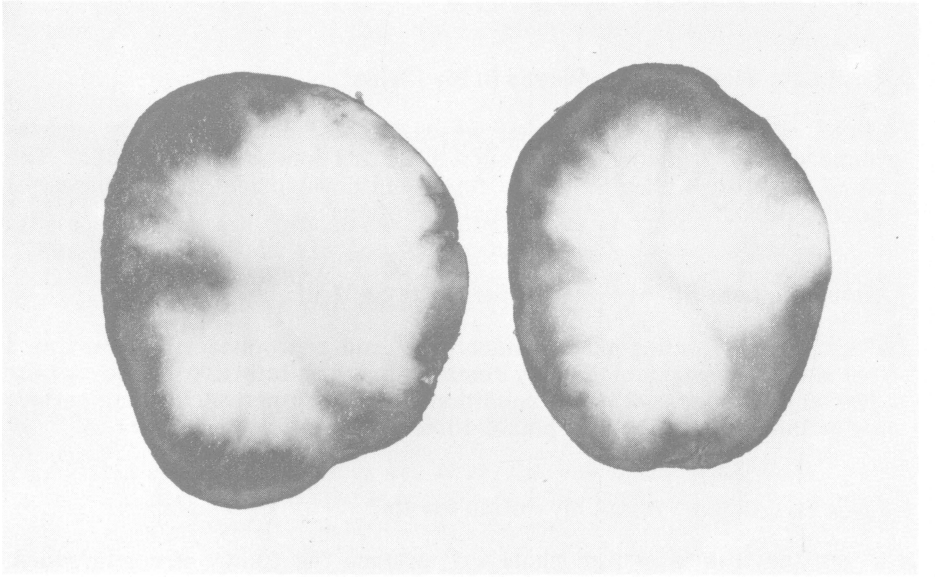
Botrytis blight, caused by the fungus *Botrytis cinerea,* is more easily confused with late blight. Leaf symptoms are similar, but the mildew phase is a **powdery, grey** mold that is quite conspicuous even if the infected foliage drys out during the day. It is most commonly seen on leaf margins of severely blighted or senescent foliage on the lower parts of the plant.

Q Where Does Late Blight Come From?

A In the northern United States, the fungus can survive the winter only in infected tubers left in the ground or in cull piles. Spores are formed the following spring on sprouts growing from blighted tubers that survive the winter and can be carried at least 5-10 miles on wind currents.

Q Can Late Blight Be Transmitted on Seed Potatoes?

A Yes! USDA grade standards for U.S. No. 1 seed potatoes allow a tolerance of 1 percent late-blighted tubers. Actual levels in certified seed potatoes vary from year to year depending upon the incidence of late blight in seed-producing areas. The use of high quality, certified seed will minimize the possibility of planting the disease along with the crop.



Potato tubers cut to show internal symptoms of late blight infection

Q Why Is Late Blight A Problem Only in Cool, Damp Weather?

A The fungus requires high moisture and cool temperatures to infect, grow and spread. Above 85° F. the fungus cannot grow at all. Between 60 and 70° F., also the ideal temperature for potato plant growth, the fungus grows well within the plants and produces spores rapidly on the foliage. The spores germinate and infect new leaves if moisture (rain, fog, heavy dew) is present and the temperature is 50-60° F. The ideal conditions for a severe outbreak of late blight would be night temperatures of 50-60° F., accompanied by fog, rain, or heavy dew, followed by day temperatures of 60-70° F. over a period of at least 4-5 days.

Q Why Does Late Blight Seem to Infect A Field "Overnight?

A Late blight is a classic "epidemic" disease. Only a few spores blown in from outside the field can start the disease, if weather is favorable. Under cool, moist conditions, these primary infections can produce billions of spores in as little as four days. When temperatures are in the 70's, each spore can germinate and cause a new late blight lesion. However, in the 50-60° F. range, each spore can divide into 6-8 swimming spores, each of which can cause new infections. By these methods, the disease can build up rapidly under favorable conditions.

Q Will Late Blight Attack Other Crops?

A Late blight is an important disease only on potatoes and tomatoes. It has been observed only rarely on other crops of the same family (Solanaceae) such as pepper and egg plant.

Q Will Late Blight Live on Weeds in My Fields?

A Practically speaking, no! A few weeds in the Solanaceae family such as ground cherry, horsenettle and nightshade are somewhat susceptible. The role of a few such plants in the survival and development of this disease is probably insignificant under normal conditions.

Q Does the Late Blight Fungus Live in the Soil?

A This fungus, unlike most, cannot grow and reproduce when separated from a living host plant. It may remain alive and infective in the soil for a few weeks under cool, moist conditions, but it can persist for long periods only within living, infected potato tubers.

Q Will Fungicides Protect My Potato Plants?

A Yes! Spraying with fungicides will protect the foliage from infection, provided the sprays are timely, cover the upper and lower leaf surfaces adequately, and are not washed off or broken down by adverse weather

conditions. Spray according to the label for the fungicide being used and shorten the spray interval in cool, damp weather, if the label permits.

For complete chemical recommendations, see the current revision of the Ohio State University Cooperative Extension Service Bulletin 459, "Control of Vegetable Insects and Diseases for Commercial Growers" or Bulletin 434, "Plant Disease Control in the Yard."

Q Why Is It Important that All Plants in the Field Be Protected?

A Lack of adequate spray coverage is the principal reason that potato growers have trouble with late blight. This is especially important when using low-volume sprays applied by aircraft. If plants in the corners of fields, along woodlots, under power lines and in other less-accessible places are not completely covered, blight spores that land there will be able to infect. These few spores can then produce billions more spores which can blow over the rest of the field. Under such a heavy spore load, even a normally adequate spray program may fail, resulting in infection of the remainder of the crop.

Q Are Some Potato Varieties More Susceptible to Late Blight?

A Plant breeders have been trying to develop late blight-resistant varieties for years. The problem is that there are many "races" of the fungus and a potato variety will be resistant to only one or a few of them. The only varieties commonly grown in Ohio that are somewhat tolerant to certain races of late blight are Kennebec and Superior. At this time, chemical protection of the foliage is the only effective means of control.

Q How Does Late Blight Infect the Tubers?

A Spores are washed off the leaves by rain and are carried into cracks in the soil. Tubers are then infected in the soil by germination of the spores. Thus, early infections are usually localized on the upper surfaces of the tubers. Adequate hilling may give some protection against tuber infection by keeping the tubers well below the soil surface.

Q Why Is it Important to Kill the Vines Before Harvest?

A As long as the potato vines are alive, the late blight fungus can remain active and may produce spores capable of infecting tubers. If the vines are still alive at harvest, these spores may be spread onto sound tubers during digging and infection may take place in storage. Killing the vines 2-3 weeks prior to harvest while **continuing** the use of fungicide sprays greatly reduces the chances of contaminating the tubers during harvest.

Q Should I Grade Into Storage if Some Tubers Are Blighted?

A If over 1 percent of the tubers are blighted, it is of utmost importance to remove as many as possible before piling the potatoes in the storage. This can be accomplished by removing as many diseased tubers as possible in the field, followed by careful grading into storage. Very light cases of blight such as occur during a late-season infection are nearly impossible to detect and grade out.

Q Will Late Blight Spread in Storage?

A The late blight fungus alone produces a dry rot of the potato tuber that usually will **not spread** in storage However, infected potatoes are highly susceptible to bacterial soft rots and **will break down quite easily.** The resulting watery rot **will spread** in storage. A large number of late-blighted potatoes can, thus, endanger the entire storage.

Q How Should I Store Blighted Potatoes?

A Storage of potatoes with a high percentage of blighted tubers is difficult, at best. Storage under normal chip-stock conditions of 55° F. and 90 percent relative humidity is nearly impossible, because these are also the ideal conditions for further disease development! Blight-contaminated tubers should be cooled to as low a temperature as is practical, preferably 38-40° F., as quickly after digging as is possible. Good circulation of air through the pile must be maintained to keep the relative humidity **below 85 percent.** Potatoes should not be held any longer than is absolutely necessary.

Q How Should I Dispose of Blighted Potatoes?

A Blighted tubers that survive the winter and sprout the following spring are the **main source** of blight spores for the next season's epidemic. It is essential that blighted potatoes are **not dumped in cull piles** where some tubers will be protected from freezing. Spreading infected potatoes sparingly on the surface of fields not intended for potato culture the following spring is the safest disposal method. Blighted potatoes that are left in the ground may also sprout the following spring and produce spores, especially if the winter is mild or there is heavy snow cover. Proper application of a systemic sprout inhibitor in the late summer will eliminate sprouting of volunteer plants the following spring and can have considerable value in reducing sources of early-season infection. Volunteer plants that do emerge from blighted fields should be eliminated if possible.